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Articles

Nota Bene for Less Money — To Institutional Purchasers 1
WATFOR-77 for the PC Available 2
Micro-to-Mainframe Links with SAS 2
IBM PC Video Display Cards: Sorting Out the Choices 4
On Video Display Adapters: the VEGA and the Graphics Solution 6
Accounting: University Fiscal Year End 8
Easier Access for VM/CMS Users 9
NetNorth — Electronic Mail Demonstrations 10
New Version of SCRIBE Installed 10
IBM Card Reader Rate Increase 11
Hours of Service 11
DATATEXT Removed 11
Disaster Planning for Magnetic Tape Storage 12

Departments

UTCS Noncredit Short Courses 12
Personnel Changes 13
Change Committee 13
Recent Acquisitions in the Computer Library 13
New Journals Received in the Computer Library 14
Technical Reports Recently Received in the Computer Library 14
Documents at UTCS 16
Consulting and Enquiries 18
UTCS Directory 18
Committees on Computing 18
UTCS Terminal and Advising Sites 19
UTCS Services 20

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Nota Bene for Less Money — To Institutional Purchasers

UTCS has recently signed an agreement allowing us to purchase the academic word processing package Nota Bene at a discount of 40% off the regular price of US$495, making it US$297 or about CAN$425 per copy.

Under this agreement we can purchase any number of copies of the package on behalf of University faculty or staff who have institutional funds to spend. In return we have agreed to provide local support of Nota Bene, that is, to answer questions about its installation and use.

Any U of T employee may arrange to purchase Nota Bene by sending a signed letter of intent to Dr. Willard McCarty, 255 Huron Street, Room 350. Please specify the number of copies and an appropriation or purchase order number. Individuals who want to spend their own money for Nota Bene can get it from local dealers or through the Modern Language Association (MLA) — although at a smaller discount. (The MLA, for example, offers a 20% discount.)

An extensive review of Nota Bene is available from the UTCS Information Office in the Engineering Annex, Room 206.

Nota Bene is currently available in Version 1.1 but is shortly to be released in Version 2.0, which promises several improvements and enhancements. Sometime after 2.0 is released, Dragonfly Software will also offer "special language versions" designed to work with the IBM Enhanced Graphics Adapter (EGA) card. Please note that 2.0 will not itself require the EGA but will continue to work with the older monochrome and colour graphics cards. The release date for 2.0 has been conservatively set for early May.

The fee for upgrading 1.1 to 2.0 is US$10. Under our agreement for bulk purchases, either version may be specified.

We will be receiving early ("Beta-test") releases of 2.0 and of at least one of the special language versions.

The Software Fair

Version 2.0 and some of the special language versions of Nota Bene will be demonstrated at the Software Fair held in conjunction with the academic conference, "Computers and the Humanities," at the University on April 16 and 17. Although the registration for the conference is limited, the Fair will be open to the public. It will be held in the Bissell Building, 140 St. George St. (the home of the Faculty of Library and Information Science), directly north of Robarts Library.

In conjunction with the new Centre for Computing in the Humanities we are preparing a guidebook that will contain extensive descriptions of the software exhibited at the Fair.

There will be approximately 27 exhibitors. Aside from multilingual word processing packages, they will be showing software for second language and writing instruction; selective-interactive text retrieval; textual analysis and concording; collation; symbolic logic; and musical training.

Anyone having questions about Nota Bene or the Software Fair may contact me at 978-8701.

Dr. Willard McCarty
MCCARTY at UTORONTO

WATFOR-77 for the PC Available

UTCS has obtained a site license and is now distributing WATFOR-77 for the IBM PC. WATFOR-77 is a FORTRAN-77 compiler developed at the University of Waterloo as the successor to their famous WATFIV compiler.

Academics and researchers can obtain a licensed version of the software for only $35/year. Because the site license is annual, UTCS can offer this product for use at the university at this excellent price. When you renew your software license each year, UTCS will trade you the latest release from Waterloo in return for the expired version.

Although WATFOR-77 is not a fast compiler, it compiles and executes in one step and is thus much more convenient than other FORTRAN compilers that require several passes and several floppy disks.

WATFOR-77 is available in two versions: one for PCs with the 8087 math coprocessor chip, and one for those without. As a bonus the WATCOM Editor is provided free of charge. This is an easy to learn and use editor that is good for progam writing and output browsing.

Three manuals are available for purchase with the compiler: the *WATFOR-77 User's Guide* (recommended), the *WATFOR-77 Language Reference Manual*, and the *WATCOM Editor User's Guide.* All are also available for reference at the UTCS Information Office in the Engineering Annex, Room 206.

For more information on WATFOR-77 or to obtain a registration contract, please contact Paul Shindman at 978-6878. Contracts can also be picked up at the UTCS Information Office.

Paul Shindman
PAULIE at UTORONTO

Micro-to-Mainframe Links with SAS

Users who have installed SAS under PC-DOS can now use a micro-to-mainframe link with either CMS or MVS, at 4800, 1200 or 300 baud. This link lets you use SAS Version 5 on the mainframe to run programs created and maintained locally on your micro. In addition, you can transfer SAS data sets between the mainframe and your PC. You work at all times in the environment provided by the SAS display manager on your micro. This article describes how the micro-to-mainframe link works and what is required on your micro, and then makes some suggestions for using the facility effectively.

Using the link is straightforward. There are two display manager commands, SIGNON and SIGNOFF, which begin and end the mainframe session. SIGNON starts a CMS (or TSO) session on the mainframe and then begins a mainframe SAS session with appropriate options. While the link is active, a third command, RSUBMIT, will submit SAS statements in the program editor window to the mainframe for processing. The SAS log and output listings from this remote processing are automatically returned to your micro session. Appendix 2 of the *SAS Language Guide for Personal Computers* (Version 6 Edition) gives tutorial examples of how to use these three commands.

Two new procedures on the mainframe, PROC UPLOAD and PROC DOWNLOAD, will copy SAS data sets to and from the mainframe. In other words, each procedure is capable of reading a SAS data set in one environment and writing out a copy

continued...

SAS continued

in the other. These procedures are documented in the *SAS Procedure Guide for Personal Computers* (Version 6 Edition). An example of their use is given below.

The key to implementing the micro-to-mainframe link is an RLINK file. This is a command file stored on your micro which controls the logon and logoff sequences for the mainframe. UTCS has developed a set of RLINK files for CMS and MVS. These can be downloaded from the SAS file area of the UTCS Bulletin Board System (BBS), and they will be distributed to all SAS PC users with the SAS/STAT software when it arrives. Information on using the BBS is available from the UTCS Information Office. The RLINK files are named xxxnnnn.SCR where xxx is CMS or TSO and nnnn is 4800, 1200 or 300 representing the intended baud rate. These six files should meet the needs of most users.

Two other RLINK files, CMSHAYES.SCR and TSOHAYES.SCR, are available for users with smart modems. As supplied, these two RLINK files are for use at 1200 baud, from an on-campus phone, and have been tested with a Hayes smartmodem 1200. Using other smart modems or dialing in from off-campus will require small changes to the character string sent to the smart modem. One other RLINK file, TSOKERM.SCR, can be used in a situation where you have already logged on to line-mode TSO (for example, using Kermit) before giving the SIGNON command from your micro SAS session.

To install the micro-to-mainframe link, choose the proper RLINK file for your choice of mainframe and access speed. Copy this file into the subdirectory on your fixed disk. Then add two lines to the AUTOEXEC.SAS file in the subdirectory from which you run SAS. For example, to use CMS at 1200 baud, you add the lines:

```
OPTIONS REMOTE=ASYNC ;
FILENAME RLINK 'CMS1200.SCR' ;
```

In general, the filename in quotes in the FILENAME command matches the name of the RLINK file you plan to use. With these changes, your micro is ready.

As an example, the following sequence of operations downloads a permanent SAS data set (SURVEY12) from a SAS library referenced by PERM to a temporary SAS data set (WORK.SURDATA) on your micro:

1. Start a SAS session on your micro.
2. Type SIGNON <ENTER> on a command line of the display manager.
3. Make a dialup or hardwire connection to UTCS PACX when prompted.
4. Supply your CMS (or TSO) access code and password when prompted.
5. Enter a CMS FILEDEF command if necessary (or a TSO ALLOC command) in the program editor window. See below for the exact form of these commands.
6. Enter these two additional commands in the program editor window:

   ```
   PROC DOWNLOAD DATA=PERM.SURVEY12
   UT=SURDATA; RUN;
   ```

7. Type RSUBMIT <ENTER> on the program editor command line.
8. Watch the notes in the SAS log window to verify that the download operation has started and that it completes properly.
9. Type SIGNOFF <ENTER> on the command line.
10. Hang up or disconnect the hardwired PACX line when prompted.
11. Work with WORK.SURDATA on the micro.

CMS users should verify that their Virtual Machine has at least 2 Megabytes of storage. More may be needed for some SAS Version 5 procedures. SAS will also require work space, either on your A disk or on a temporary minidisk created with a TEMPDISK command in your PROFILE EXEC. CMS FILEDEF commands are required only if permanent SAS data sets are stored on a minidisk other than your A disk. In the example above, step 5 can be skipped if the SAS data set is stored in SURVEY12 PERM A, but the following command is needed if it is stored in SURVEY12 PERM F:

```
CMS FILEDEF PERM DISK DUMMY DUMMY F;
```

continued...

SAS continued

MVS users must call UTCS Accounting Services and have a TSO access code set up for their GPJS SAC, if they are not current TSO users. You need to know only one TSO command to use the micro-to-mainframe link. SAS data sets intended for downloading may have been created with SAS jobs submitted from WYLBUR or some other Remote Job Entry system. For example, the following TSO ALLOC command is used in step 5 of the above procedure when the SAS library is stored in U01234.OPINION.SASLIB:

```
TSO ALLOC FI(PERM) DA('U01234.OPINION.SASLIB') ;
```

Note well that the TSO ALLOC command must be typed correctly. In particular, verify the existence of and spelling for the dataset containing the SAS library and make sure you enclose it in single quotes. SAS Institute does not currently provide a way within the RLINK session to recover from errors in a TSO command. If you do make a mistake, no messages will be sent to your log window once the incorrect TSO command has been issued. You can still use SAS on your micro, but you must kill the background TSO session before resuming work with the micro-to-mainframe link.

In the example above, you normally see a message in the log window that the download operation has commenced. If you wait 60 seconds and this message has not come, type <CTRL/C> followed by an A to return control to your micro. Complete anything outstanding in your SAS session (e.g. filing the contents of the log window or putting a temporary SAS data set into a permanent library). Then end your SAS session, disconnect from PACX, and either ask the operator at 978-7393 to kill your TSO session or wait 20 minutes for the disconnected TSO session to be killed by the system.

The time required for uploading a SAS data set varies with baud rate and data set size. For example, it took 30, 90 and 330 seconds to upload a SAS data set with 300 observations and three numeric variables at 4800, 1200 and 300 baud respectively. The times doubled for a SAS data set with 300 observations and six numeric variables. Times for downloading were comparable. These numbers provide a starting point for estimating the real time required to upload or download SAS data sets.

It is not expected that users will need to modify the RLINK files provided by UTCS. Anyone considering making changes to an RLINK file should first read the SAS Institute Technical Report: P-144 "Writing RLINK Files for the Micro-to-Mainframe Link." This can be ordered through the UTCS Information Office.

Please call UTCS Advising Services at 978-HELP with questions, comments and requests for information about these RLINK files.

Bill Fehlner
FEHLNER at UTORONTO

IBM PC Video Display Cards: Sorting Out the Choices

A video adapter card is a circuit board that plugs into the IBM PC and displays information on a video display or monitor. There are four common types of video display adapters:

1. The **colour graphics adapter card** displays text and graphics on the video monitor. The text and graphics can appear in various colours, depending on the type of monitor you are using. The number of colours used depend on the amount of information you wish to display. You can display 16 colours with 40 characters per line or low-resolution graphics, 4 colours with 80 characters per line or medium-resolution graphics, or one colour with high resolution graphics. The colour graphics adapter works with three

continued...

IBM PC Video Display continued

types of monitors: a composite monochrome monitor,[1] a composite colour monitor,[2] or an RGB colour monitor.[3] Text is not very clear with the colour graphics adapter (often referred to as the CGA), and extended use can cause eyestrain.

2. The **monochrome adapter card** can display text characters only, but they are very clean, crisp characters so that extended use is much more pleasant. The monochrome adapter works only with a "TTL monochrome"[4] monitor. The adapter cannot display graphics and has only one colour.
3. The **monochrome graphics card** is capable of the same high quality text as the standard monochrome adapter and works with the same TTL monochrome monitor, but it can also display graphics. The graphics can be higher resolution than those of the colour graphics adapter card, but they are in one colour only. IBM has never offered a monochrome graphics adapter card in its family of PC products, so a number of other companies have designed various forms of monochrome graphics cards. A company called Hercules produced what is probably the most popular and most copied monochrome graphics board, but there are a number of others that make it possible to display graphic information on the TTL monochrome monitor. The Hercules Monochrome Graphics Card requires programs designed specifically to work with it. Because of the popularity of the Hercules board, many software packages have been designed with Hercules options. Other companies have designed their monochrome graphics boards to work directly with programs written for the colour graphics adapter; no changes or special options in the program are required for these boards. There is an excellent review describing a number of the most common monochrome graphics adapter cards in *PC Tech Journal* (January 1986), page 70.
4. Another type of colour graphics adapter is the newer **enhanced graphics adapter**, commonly called the EGA. It can display monochrome text, colour text and colour graphics. Text and graphics can be shown in more colours, and the graphics can be much sharper, than with the colour graphics adapter. It can also act like a standard colour graphics adapter to take advantage of the programs written for the colour graphics adapter. Some programs designed for the colour graphics adapter are unable to work with the enhanced graphics adapter even when it is acting like the colour graphics adapter. The enhanced graphics adapter works with an RGB colour monitor, a TTL monochrome monitor or an enhanced colour monitor. To take advantage of the better graphics available through the enhanced graphics adapter, you need to use the enhanced colour monitor. Text on the enhanced colour monitor is better than that of an RGB colour monitor, but not as clear as on a TTL monochrome monitor. Anoth-

continued...

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[1] Composite monochrome monitors display in one colour only, and all the video information is passed to the monitor as a single signal.

[2] Composite colour monitors can display many colours, and all the video information is passed to the monitor as a single signal.

[3] RGB stands for Red Green Blue; RGB monitors display many colours, and all the video information is passed to the monitor as separate signals.

[4] TTL stands for Transistor Transistor Logic and describes some of the circuitry inside the monitor. A TTL monochrome monitor displays in one colour, and the video information is sent to the monitor as separate signals.

IBM PC Video Display continued

er feature that makes the enhanced graphics adapter attractive is the ability to download the character set that is to be displayed. This means the characters displayed need not be Roman characters, but could be Hebrew or Greek or any other type. New software is now coming out that takes advantage of this capability.

There are a number of cards on the market now that act like one or more of the adapter cards described above, or even like all of them. Some do it better than others! See the next article, "On Video Display Adapters: the VEGA and the Graphics Solution," for reviews of some of these boards.

Terry Jones
TJ at UTORONTO

On Video Display Adapters: the VEGA and the Graphics Solution

As you may know, there are several "standard" techniques for video display on the IBM PC and compatibles: monochrome,[1] colour graphics, monochrome graphics (the most popular of these is "Hercules"), and the relatively new one embodied in IBM's EGA or Enhanced Graphics Adapter. These four are briefly explained in the preceding article, "IBM PC Video Display Cards: Sorting Out the Choices." For text, monochrome is almost always preferred because of its superior resolution, but it is limited to shapes already defined in hardware. Monochrome graphics was invented to circumvent this limitation, and although very popular it is not universally recognized by software. The EGA technique represents another attempt to provide graphics in a monochrome display but does not support Hercules.

None of these techniques shows any sign of waning. Some users will never require more than one; others, however, will at some point want to run packages that demand all four of them. These users will thus be faced with a difficult choice: either to give up using the software their hardware cannot support; or to buy an additional card to cover the deficiencies of the existing one; or to buy a card that supports all techniques fully. Prior to the EGA most people working with text could either ignore anything but monochrome or buy a relatively inexpensive clone of the Hercules card, but this is becoming increasingly difficult with the growing recognition of the EGA and of graphics.

Given the present "standards" for video display, the ideal board for a person who works with text would have the following characteristics:

1. it would emulate all four of these standard techniques;
2. it would support all of its emulations *on a monochrome monitor*,
3. it would also support EGA and colour graphics on
   a. the ordinary RGB colour monitor,
   b. on a composite monitor, and perhaps
   c. on IBM's newer Enhanced Colour Monitor.

The first is obviously essential and, since the image quality on a monochrome monitor is superior to all the other kinds, so is the second. The rest would be necessary for some applications but not for a majority.

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[1] The term "monochrome" is used here to mean the so-called "TTL monochrome" display, the sense given it by IBM. See the *Academic's Guide to Microcomputer Systems* for more information.

Video Display Adapters continued

In the remainder of this article I will review very briefly two display cards, the VEGA and the ATI Graphics Solution. Both of these cover almost but not quite all of the possibilities.

The VEGA[2] satisfies all criteria but the second, since it will not emulate colour graphics on a monochrome monitor. This is a significant failing, and one wonders why the extra circuitry was not provided; there is room enough on this half-length card.

Otherwise, the VEGA seems an excellent product.[3] All emulations worked perfectly in our tests. It has 256K of on-board video RAM, unlike the IBM EGA, which comes with 64K and requires expensive additions to reach 256K. In some cases switching from one emulation to another is a software operation, in others it requires setting physical switches on the VEGA that can be reached from the back of the PC without opening up the case. These switches and the video connectors unfortunately leave no room for a parallel port.

The ATI Graphics Solution[4] is an older board and hence has had more opportunity to be known and tested in the field. It satisfies the second criterion plus 3a and 3b. For the first, it emulates all but the EGA. Thus, like the Paradise Modular Graphics, Genoa Spectrum Graphics, and other such adapter cards, it will emulate colour graphics on a monochrome monitor as well as provide ordinary monochrome and Hercules graphics. It is also an excellent board; in our tests it has performed without fault. Physical switches can be set so that it is automatically initialized in any of its modes except the Hercules, which requires software to initiate it; software can also be used to change the other emulations.

The lack of EGA emulation on the Graphics Solution is its serious drawback. On the one hand, the growing popularity of the EGA technique (e.g., for representation of non-Roman characters) suggests that any board without EGA emulation will not long remain attractive to academics. On the other, the Hercules technique is still popular among software developers and so cannot be ignored. For those who do not have to acquire a new display adapter soon, it would seem wise to wait for the "perfect" board, which (in the terms used here) is probably not far off. For those who cannot wait, the VEGA seems as close to perfection in kind as anything we have yet seen.

Extensive reviews of the VEGA and Graphics Solution boards are in progress and will appear in written form on the Microcomputer Bulletin Board System and in the second edition of the *Academic's Guide.* Questions about these boards should be addressed to the Microcomputer Support Group at 978-8701.

Dr. Willard McCarty
MCCARTY at UTORONTO

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[2] The VEGA is manufactured by Video-7 Corp. of California, which also makes the identical QuadEGA for Quadram. To our knowledge there are now two other cards like it: the Genoa Spectra EGA and the Mega Graph. The VEGA costs about CAN$750.

[3] We have seen only the prototype, which is a full-length board, so we cannot be completely confident about the standard, half-length model that is advertised.

[4] The Graphics Solution is made by a local company, Array Technologies Inc., and costs about $370; the optional parallel port costs an additional $50. The Micro Lab at UTCS currently has one of these boards on loan.

Accounting: University Fiscal Year End

Users are reminded that the University Fiscal Year End is April 30. This means that all blanket orders (Encumbrance Memos) raised for computing on a Departmental Appropriation Account (Ledger 1) will expire with the approach of that date.

The Comptroller's Office has given UTCS a billing close-off date of April 23 for charges to blanket orders. Therefore, the last day for accruing machine charges, to be applied to the blanket order, is April 22. The balance of the department's appropriation account after the April 23 billing is processed by the Comptroller's Office.

The balance of April's charges, from April 23 through 30 (at 5:00 p.m.) will be charged to the free balance of the appropriation, to the limit returned to the free balance. For example, if the remaining balance of a blanket order is $200 after billing and the total usage for the last seven days of April is $225, $200 will be billed to the free balance, and the remaining deficit of $25 will be carried forward and billed to the blanket order for the new budget year. The Accounting Services Office may be able to assist an account administrator in avoiding a deficit carryforward at the end of the budget year. Surplus funds in the free balance of the appropriation account may be carried forward. The last date for billing to an appropriation number through a Debit Memo is April 23.

In order to achieve uninterrupted service over the year end, account administrators are advised to do the following:

1. Supply the Accounting Services Office with a blanket order (Encumbrance Memo) for the new budget year by April 18. It should clearly show the BPOA holder's name, the BPOA number, the dollar amount, and the 1985/86 Encumbrance Memo number that it is replacing. In the case of a new account, where the BPOA and previous Encumbrance Memo numbers are not available, "NEW ACCOUNT" should be indicated.
2. If more than one CAN is associated with the BPOA, a listing should be made of the CANs to be used in the new year and the initial spending limit of each. A course name or project title should also be included if this information is desired on accounting reports for identification purposes. If new CANs are required and/or previous CANs are to be closed, this information should be included on the same listing.
3. Service Access Codes (SACs) should be checked to determine whether they are required in the new year. If they are, the expiry date should be checked and changed if necessary. Spending limits are another important consideration. If changes to total spending limit and usage to date require resetting, this information should also be communicated before the end of April. It has been the practice of Accounting Services in past years to calculate the balance remaining on a GPJS SAC, use this figure to establish the new spending limit and set the accumulated usage amount to zero. For example: if, at midnight on April 30, the SAC shows a spending limit of $300 and usage to date of $275, the SAC would be reset to show the spending limit as $25, and usage to date as 0. This will be done automatically for all instructional and administrative GPJS SACs (not Research), unless you instruct otherwise. As you can see from the preceding example, establishing the old balance as the new spending limit may not be adequate to carry on work planned for May.
4. To ensure that the final billing includes all charges relating to a job run at 5:00 p.m. on April 30, jobs in the hold queue must be printed or purged by the user.

continued...

Fiscal Year End continued

The discussion thus far has dealt mainly with the year-end situation as it normally affects instructional and administrative type users. Researchers are also affected by the expiration of departmental subsidy blanket orders. In this case, Departmental Computing Representatives are requested to supply Accounting Services with a copy of the new subsidy blanket order for each researcher by April 18.

We hope that this information is enough to help but not to confuse. Account Administrators are encouraged to discuss any doubts or difficulties arising with accounts or access codes at anytime by calling the Accounting Services staff at the following numbers.

Agatha Stevens	978-8703
Sylvia May	978-7148
Marg Doherty (Supervisor)	978-8697

Mail should be addressed as follows:

UTCS Accounting Services
255 Huron Street, Room 337
University of Toronto

You may prefer to pay us a visit on occasion. We are here from 9:00 a.m. to 5:00 p.m., Monday through Friday.

Marg Doherty
DOHERTY at UTORONTO

Easier Access for VM/CMS Users

As you may know, many UTCS customers access our services through either of two switching systems: PACX (Private Automatic Computer eXchange) and NTS (Network Terminal Servers). Although based on different technologies, PACX and NTS perform the same function. They allow you to choose the service you want and then give you access on one of the communications lines assigned to that service. Signing on through PACX and NTS is simple, but now there is an even easier way for VM/CMS users.

Three of our terminal sites have public terminals directly connected ("hardwired") to CMS. This means that when you turn the terminal on, the CMS salutation screen will appear immediately, and you may log in. This is convenient for CMS users, but it could benefit others as well. If CMS users take the hardwired terminals first, there will be more PACX or NTS terminals for those who want to access other UTCS services. The CMS terminals are in the Engineering Annex (Room 107B), Sidney Smith (Room 1073) and Robarts Library (Room 1061A); if you cannot find them, ask the UTCS site coordinator to show you where they are.

No matter how you access the service, there is still a limit to the number of lines available for VM/CMS users. If all of those lines are already in use, you must either join a queue or try again later. This does not happen often, because UTCS monitors the use of the lines and frequently adjusts the number dedicated to each service. There is also a limit to the number of lines that VM itself can accommodate; even if there are communications lines open, you may still have to queue because the system is full. Again, this does not occur often. If it has ever happened to you, though, you know how frustrating it can be.

One way to help avoid a queuing problem for everyone is to make sure you break your connection to PACX or NTS after you log off from CMS. If you are using a public terminal at any of our sites, enter a BREAK (SHIFT and BREAK together on an XT-100); if you are not sure how to do that, just turn the terminal off. If you have a modem (e.g., a Gandalf LDS125), switch it off.

Martha Parrott
PARROTT at UTORONTO

NetNorth — Electronic Mail Demonstrations

UTCS has had many enquiries from users interested in the NetNorth/BITNET/EARN communications network. This network, accessible from CMS, reliably connects over a thousand universities and research institutes in Europe, Asia, and North America.

Sending mail, data, documents or other files on NetNorth is a very simple task that anyone can learn quickly. Sending mail in this way is also very inexpensive. For example, an account used only for sending mail to Europe and Asia (not for programming or text formatting) would cost between $200 and $300 per year at the UTCS Internal rate — about the same as your department's commercial telephone line, without the long distance charges! (Affiliated research institutions and organizations charged at the External rate would pay a higher annual amount.)

Three demonstrations of how to use NetNorth will be held at **9:00, 10:00** and **12:00 noon** on **Tuesday, April 15** in the UTCS Education Facility, Room 221 in McLennan Physical Laboratories.

The demonstration, lasting just under an hour, will include how to send mail and files to another institution and how to talk directly to someone on the network.

Because classroom space is limited, please reserve a place by calling the Education Coordinator at 978-4565.

Paul Shindman
PAULIE at UTORONTO

New Version of SCRIBE Installed

A new version of SCRIBE was installed on the VM/CMS system on March 21. The previous version of SCRIBE was a ‘‘pre-release’’ version -- basically a system under development. The changeover to the new version has allowed UTCS to implement the IBMTN and IBMALA character enhancements that until now were available only on GP UNIX. CMS users can now access all of the special characters and accents shown in Tables 1, 2, and 3 in the UTCS Guide to SCRIBE. Complete instructions for accessing these special characters are found in the newest version of the Guide to SCRIBE. Please note that these characters are available for line printing only.

If you are interested in using the extended characters now available, please read the UTCS Guide to SCRIBE. If you experience formatting difficulties with the new version of SCRIBE on CMS or if you have any questions not answered by the Guide to SCRIBE, contact Patricia Hood at 978-4548.

Patricia Hood
PHOOD at UTORONTO

IBM Card Reader Rate Increase

At the Engineering Annex site (EA), UTCS provides an IBM Model 2501 card reader, which is attached to the MVS Academic computer. Over the past few years the use of this device has steadily declined, while the cost of maintenance has steadily risen. We have, on several occasions, pointed out that this combination of events will lead to the demise of this device. We have, however, been aware that some of the demand for the card reader stems from the presence of the OMR feature, which is not found elsewhere on campus.

To retain this device for a while longer it will be necessary to increase the charging rate for cards read. Effective May 1, 1986 the charging rate will be $12.50 per thousand cards read. While this represents a substantial increase over current rates, our worst-case estimate would lead to a rate of $25.00 per thousand cards read.

We will be monitoring the use of the card reader over the coming months and may readjust the charging rate later in the year. We will also be investigating alternative options to the use of the OMR feature.

Bob Chambers
BOBC at UTORONTO

Hours of Service

Victoria Day Weekend			
	May 17 (Saturday)	May 18 (Sunday)	May 19 (Monday)
IBM MVS GPJS(Classes B and E, Calcomp)	10:00-18:00*	10:00-18:00*	closed
IBM MVS GPJS(Class A, WYLBUR, APL, TSO)	10:00-18:00*	10:00-18:00*	unattended
IBM VM/CMS	10:00-18:00*	10:00-18:00*	unattended
GP UNIX	unattended	unattended	unattended
Normal hours of service for all systems will resume Tuesday, May 20, 1986.			
* *Running unattended outside these hours.*			

DATATEXT Removed

DATATEXT was removed from the UTCS MVS system on March 7, 1986. It was a statistics package whose very low usage did not justify continuing to pay the annual license fee. Comparable statistical procedures are available in SAS, SPSSX and BMDP. Data cleaning features are available with the FILEBOL utility package.

Please call Central Advising at 978-HELP if you have questions regarding which alternate package will suit your application.

Bill Fehlner
FEHLNER at UTORONTO

Disaster Planning for Magnetic Tape Storage

UTCS would like to stress to our users the importance of making backup copies of any valuable data stored on magnetic tape in UTCS libraries. UTCS does *not* back up data stored on magnetic tape. A physical disaster such as fire or flood could result in permanent damage, but a disaster is not the only way a tape can be damaged or destroyed. While UTCS procedures are designed to protect data stored on tapes, occasionally a mechanical malfunction in a tape drive will irrevocably destroy a tape. Moreover, human error could result in the wrong tape being mounted and overwritten.

UTCS considers it most important that all users realize the potential risk of loss. You are encouraged to minimize accidental loss of important data by managing your own backups and by maintaining the copies of your magnetic tape data files in a location other than the UTCS tape library.

Ron Vander Kraatz
RVK at UTORONTO

UTCS Noncredit Short Courses

UTCS offers a number of noncredit short courses on the various products and services supported by UTCS and available on mainframe computers. These courses were designed to assist people who have found themselves becoming more involved with computers and information processing systems. The courses offered are geared toward text processing, for those who want to enter a thesis or manuscript online, and toward statistical applications, for people wanting to do data analysis and produce reports.

The following courses are available at UTCS:

FORT/CMS101 - Introduction to CMS for FORTRAN Users
JCL101 - IBM Job Control Language for Beginners
SAS101 - Introduction to SAS
SAS201 - Intermediate SAS
SAS/CMS101 - Introduction to SAS and CMS
SAS/GRA101 - Introductory SAS/GRAPH
TXT/CMS101 - XEDIT and SCRIBE on CMS
TXT/UNIX101 - *ed* and SCRIBE on GP UNIX
TXT/SCR102 - SCRIBE Formatter
TXT/SCR202 - Special SCRIBE Topics
TXT/UNIX103 - *nroff/troff* on GP UNIX
TXT/UNIX203 - *tbl* Program on GP UNIX

The following courses are scheduled for **April** and **May**:

SAS101: Introduction to SAS
Date: April 14-18, 1986
Time: 2:00-4:00 p.m.

SAS/CMS101 - Introduction to SAS and CMS
Date: May 5-16, 1986
Time: 9:30-11:30 a.m.

TXT/UNIX - *nroff/troff* on GP UNIX
Date: April 21 - May 1, 1986
Time: 2:00-4:00 p.m.

Complete course descriptions are available in the Information Office, Engineering Annex, Room 206.

If you would like further information, or if you want to register for any of these courses, please contact:

Education Coordinator
978-4565

Irene Rosiecki
ROSIECKI at UTORONTO

Personnel Changes

Thomas Molnar has joined UTCS as the new UNIX System Software Programmer. Tom previously worked at the Faculty of Library and Information Science. Welcome!

Change Committee

Changes to the IBM Academic MVS Machine Services

1. HSM backup tapes cleanup was implemented on March 3. The backup tapes will be cleaned up by deleting datasets in BCDS, that are uncatalogued and unregistered and that are 14 days old or older.
2. The 85.1 version of WSCRIPT was installed for Batch and TSO, and the TSO prompter was replaced with CLIST on March 4.

Changes to Academic VM Machine Services

1. A central place to put information for UTCS Execs with information like SAC/PASSWORDS was provided on February 28.
2. GETUTCA was implemented on February 28 to migrate copies of files from UTCA to CMS with ease.
3. WATFOR-77 1.3 was installed as "NEW" on February 21.
4. The CHARGES command enhancement was implemented on February 10. The CAN holder is able to authorize one or more USERIDs to view charges for all USERIDs funded by the CAN.
5. Waterloo C production was upgraded from 1.1 to 1.2 on February 21. This will provide ease of use for Turing.

Changes to Other Systems and Services

1. Higher quality paper on the 8700 was made available at 6 cents per sheet on February 28.
2. WATFOR-77/DOS was made available to Faculty and Staff of the St. George Campus on March 3.
3. Access to EPAS by 3270 was provided when the Fibronics 3270 to Fibre equipment was placed in production.

Beverly Scarborough
BEVS at UTORONTO

Recent Acquisitions in the Computer Library

American Society for Information Science.
Proceedings, v.22 (1985)
White Plains, N.Y., Knowledge Industry Pub., 1985.

Association for Computing Machinery.
ACM guide to computing literature, 1984.
New York, ACM, 1985.

Association for Computing Machinery.
Proceedings of the national conference, Denver, Oct. 1985.

Barron, David William.
Advanced programming; a practical course, by D.W. Barron and J.M. Bishop.
Chichester, Eng., Wiley, 1984.

continued...

Computer Library continued

Clinic on Library Applications of Data Processing, 21st,
University of Illinois, 1984.
Proceedings, (Telecommunications: making sense of new technology and new legislation)
Urbana, 1985.

Computer Personnel Research Conference.
Proceedings, no. 21 (1985)

Data Communications Symposium, 9th, 1985.
Proceedings. (ACM SIGCOMM. v.15, no. 4)

New Journals Received in the Computer Library

Computational intelligence.
Volume 1, number 1, February 1985 -

Stephanie Johnston

Technical Reports Recently Received in the Computer Library

Carnegie-Mellon University.

Borenstein, Nathaniel S.	The design and evaluation of on-line help systems. 279 p. #CS-85-151.
Kurki-Suonio R.	Towards programming with knowledge expressions. 21 p. #CS-85-153.
Lucas, Bruce D.	Generalized image matching by the method of differences. 144 p. #CS-85-160.
Shombert, Lee A.	Using redundancy for testable and repairable systolic arrays. 141 p. #CS-85-157.

Carnegie-Mellon University. The Robotics Institute.

Giuse, Dario.	DP - format of the drawing files. 23 p. #RI-TR-85-16.
Sathi, Arvind, et al.	Representation of activity knowledge for project management. 53 p. #RI-TR-85-15.
Van Winssen, J.C. & deSilva, C.W.	Accurate trajectory control of robotic manipulators. 50 p. #RI-TR-85-15.

University of California, Los Angeles.

Afek, Yehuda.	Distributed algorithms for election in unidirectional and complete networks. 115 p. #CSD-850036.
Leung, Kin Kwong.	Task response time and module assignment for real-time distributed processing systems. 169 p. #CSD-850041.

continued...

Computer Library continued

Pearl, Judea and Paz, A.	Graphoids: a graph-based logic for reasoning about relevance relations. 27 p. #CSD-850038.
Quilici, Alexander Eric.	Human problem understanding and advice giving: a computer model. 94 p. #CSD-850039.

Wang Institute

Bernstein, Philip A.	A proof technique for concurrency control and recovery algorithms for replicated databases. 30 p. #TR-85-21.
Gill, Timothy D.	A simple environment for project development under UNIX. 29 p. #TR-85-22.
Ligett, Dan.	RCS revision control system on UNIX. 34 p. #TR-85-20.
McKeeman, W.M.	Experience with a software engineering project course. 17 p. #TR-86-01.

Stephanie Johnston

Documents at UTCS

All vendor-produced documentation may be ordered through the UTCS Information Office, Room 206, Engineering Annex. UTCS documents and selected vendor documents are also stocked there for purchase. Whenever feasible, documents are made available online, and users are encouraged to print their own copies. On the MVS and VM machines, special commands have been provided for this purpose.

To print online documents on:

IBM MVS	**IBM VM/CMS**	**GP UNIX**
WYLBUR users type "do document?"	type "help document"	use *ipr* command
TSO users type "help document"		
APL users type ")LOAD 1 UTCSGUIDE<CR>HELP"		

See examples at the end of next page.

UTCS Documents in hardcopy

New:

Previously announced:

Academic's Guide to Microcomputer Systems
Character Sets for Highspeed Printing
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics
UTCS GUIDE TO PRODUCTS AND SERVICES: Accounting
UTCS Catalogue: Access, Part 1
UTCS Catalogue: Access, Part 2
UTCS Catalogue: IBM MVS Utilities
UTCS Catalogue: Numerical Products
UTCS Catalogue: Statistics Products
UTCS Catalogue: Storage
UTCS Catalogue: Text Products
UTCS Guide to Census Tapes
UTCS Guide to File Transfer Service
UTCS Guide to KERMIT
UTCS Guide to Mainframe File Transfer Facility
UTCS Guide to Text Processing on GP UNIX

UTCS Documents online	**MVS MANUAL**	**CMS LISTING**	**GP UNIX**	**Forms Code**
New:				
Previously announced:				
UTCS GUIDE TO PRODUCTS AND SERVICES:				
Basics	BASICS	BASICS	/usr/doc/utcs/basics	*
UTCS Catalogue: Access, Part 1	ACCESS1		/usr/doc/utcs/access1	*
UTCS Catalogue: Access, Part 2	ACCESS2		/usr/doc/utcs/access2	*
UTCS Catalogue: IBM MVS Utilities	MVSUTIL	MVSUTIL		*
Product-Function List	UTILLIST	UTILLIST		BXQD
UTCS Catalogue: Numerical Products	NUMCAT	NUMCAT		*
Product-Function List	NUMLIST	NUMLIST		BXQD
UTCS Catalogue: Statistics Products	STATCAT	STATCAT		*
Product-Function List	STATLIST	STATLIST		BXQD
UTCS Catalogue: Text Products	TEXTCAT	TEXTCAT	/usr/doc/utcs/textcat	*
UTCS Guide to APL	APLGD			*
UTCS Guide to APLXFR	APLXFR			*
UTCS Guide to BMDP	BMDP	BMDP		*
UTCS Guide to Census Tapes	CENSUS	CENSUS	/usr/doc/utcs/census	*
UTCS Guide to File Transfer Service	FTS			*
UTCS Guide to GP UNIX			/usr/doc/utcs/gpunix	*
UTCS Guide to GPJS	GPJSX	GPJSX	/usr/doc/utcs/gpjs	*
UTCS Guide to Highspeed Printing	PRINT	PRINT	/usr/doc/utcs/print	*
UTCS Guide to IBM MVS Online Storage	IBMDISK	IBMDISK		*
UTCS Guide to KERMIT	KERMIT	KERMIT	/usr/doc/utcs/kermit	*
UTCS Guide to Mainframe File Transfer Facility	MFTF			*
UTCS Guide to Micro Laser Printing	MICRLASR	MICRLASR		*
UTCS Guide to SAS	SAS	SAS		*
UTCS Guide to SCRIBE (For printing instructions, see page 1 of document)		SCRIBE	/usr/doc/utcs/scribeguide	*

**Recommended forms code for the 8700 is YXLE unless otherwise stated.*

UTCS Documents online	**MVS MANUAL**	**CMS LISTING**	**GP UNIX**	**Forms Code**
UTCS Guide to Series/1 Terminal Use	SERIES	SERIES		*
3270 Emulation:				
UTCS Guide to Cybernex APL100 and Volker Craig VC404	CYBER	CYBER		*
DM1520	DM1520	DM1520		*
Hardcopy Terminal	HARDCOPY	HARDCOPY		*
IBM 3101	IBM3101	IBM3101		*
IBM PC KERMIT	PCKERMIT	PCKERMIT		*
SOROC IQ	SOROC	SOROC		*
VT52	VT52	VT52		*
VT100	VT100	VT100		*
UTCS Guide to SPSS	SPSS	SPSS		*
UTCS Guide to SUBUTILS	SUBUTILS	SUBUTILS		*
UTCS Guide to Text Processing on GP UNIX			/usr/doc/utcs/text	*
UTCS Guide to TFW.MAK in SCRIBE		TFWMAK	/usr/doc/utcs/tfwguide	*
UTCS Guide to TSO	TSOGD			*
UTCS Guide to UTDSUTIL	UTDSUTIL	UTDSUTIL		*
UTCS Guide to VM/CMS	CMSGD	CMSGD		*
UTCS Guide to WYLBUR	WYLINTRO			*
UTCS WYLBUR Tutorial	WYLTUTOR			*
Other Documentation online:				
Kermit Protocol Manual	KERMITPM	KERMITPM		YXOE
Kermit User Guide	KERMITUG	KERMITUG		YXOF
Waterloo SCRIPT				
Reference Manual	WSCRPTRF	WSCRPTRF		YXLC
User's Guide	WSCRPTUG	WSCRPTUG		YXLC
GML USER'S Guide	GMLUG	GMLUG		YXLC
OBS WYLBUR				
Messages and Codes	WYLMSGS			YXLD
Qwik Files	WYLQWIK			YXLD
Reference Summary	WYLREFCD			YXLG
Reference Manual	WYLREFMN			YXLD
7.0 Release Guide	WYLREL70			YXLC
User Guide	WYLUSER			YXLD

In these examples, the document to be printed is the UTCS Guide to Census Tapes (MANUAL/LISTING=CENSUS).
<CR> means carriage return.

TSO:	document census forms(yxle) <CR>
WYLBUR:	do document <CR> and respond to the prompts.
CMS:	document <CR> <CR> laser census listing (forms yxle <CR>
GP UNIX:	nohup ipr -8p -fyxle /usr/doc/utcs/census & <CR>

* *Recommended forms code for the 8700 is YXLE unless otherwise stated.*

Consulting and Enquiries

Applications Support & Advising Supervisor	Alex Nishri	MP257	978-7109
External Marketing Consultant	Ihor Prociuk	MP350	978-6875
Erindale College	Joe Lim	ER2035	828-5311
Scarborough College	William Barek	SC626	284-3173
General Enquiries	Dale Wright	EA206	978-4990
Account & Access Code Enquiries (U of T)	Agatha Stevens	MP337	978-8703
Account & Access Code Enquiries (External)	Sylvia May	MP337	978-7148
IBM PC Maintenance	Kam Mark	SF4306	978-5050
Tape Library (Academic Services)	Rosa Ciddio	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
Terminal Rentals	tba	SF4306	978-3787
U of T Computer Library	Stephanie Johnston	EA206	978-2987

Consulting & Advising Services		300 Baud Interactive Services	978-6200
Phone:	978-HELP	1200 Baud Interactive Services	978-3959
CMS, TSO and GP UNIX userids:	ADVISOR	Datapac	4320 0056
CMS Userid for mail problems:	POSTMSTR	Telnet	0302043200056
Microcomputer Support Advising(MSG)	978-8701	Tymnet	<backspace> DPAC;302043200056
Numerical/Statistical Advising(SNAC)	978-STAT		
System Status Enquiries (GP UNIX)	978-4318		
System Status Enquiries (IBM)	978-7393		
UTCS Noncredit Short Courses	978-4565		

UTCS Directory

Director	Dr. Warren Jackson	MP350	978-8948	WCJ at UTORONTO *
Associate Director	Eugene Siciunas	MP350	978-5058	EUGENE at UTORONTO *
Managers:				
Communications & Technical Support	Norman Housley	SF4306	978-4967	NORMAN at UTORONTO *
Internal Systems & Administration	Ron Vander Kraats	MP350	978-4428	RVK at UTORONTO *
Operations	Dr. Bob Chambers	MP350	978-7092	BOBC at UTORONTO *
Systems	Bill Lauriston	MP331	978-3579	BILL at UTORONTO *
User Interface	Don Gibson	MP350	978-7331	DON at UTORONTO *

Committees on Computing

UTCS Board	Chairman	Prof. D.M. Nowlan	978-4984	NOWLAN at UTORONTO *
Natural Language Processing Steering Committee	Chairman	Prof. I. Lancashire	978-6487	IANL at UTORONTO *

ER = Erindale **SC = Scarborough**
MP = McLennan Physical Labs **SF = Sandford Fleming**

* NetNorth/BITNET/EARN

UTCS Terminal and Advising Sites

Names and Locations

- **Central Advising Office (CAO), 978-HELP**
- **Education Facility (Educ)**, McLennan Labs, 255 Huron St., Room 221
- **Engineering Annex (EA, CDF)**,11 King's College Road, Rooms 103, 104, 107, 107B, 201, 203.
- **Erindale College (Erin), 828-5339**, Mississauga Road, Erindale Campus, Rooms 2005, 2039, 2045
- **Robarts**, Robarts Library, 130 St. George St., Room 1061A
- **Scarborough College (Scar), 284-3122**, Military Trail, Scarborough Campus, Rooms S624, S625, S627, S628, S628A
- **Sidney Smith (Sidney)**, 100 St. George St., Rooms 1071, 1073, 2105
- **St.Michael's College**, 121 St. Joseph St., Room 107
- **Trinity College**, 6 Hoskins Ave., Room 024
- **Victoria University**, 73 Queens Park Cres., Room 005.

Sites	Hours of Access				Restrictions*	Advising
	Mon-Thurs	Fri	Sat	Sun		
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	No
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Educ	24 hrs†	24 hrs†	24 hrs†	24 hrs†	Research**	978-HELP
(outer)	24 hrs†	24 hrs†	24 hrs†	24 hrs†	Research	978-HELP
Erin (2039)□	9:00-17:00	9:00-17:00	12:00-16:00	12:00-16:00	Research	Rm 2005
(2045)	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	Rm 2005
Robarts	8:30-24:00	8:30-24:00	9:00-17:00	13:00-22:00	None	978-HELP for Research
Scar	9:00-24:00	9:00-24:00	10:00-17:00	closed	Research	Rm S626
					Undergrads	Rm S626-A
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
St.Michael's	24 hrs	24 hrs	24 hrs	24 hrs	None	Arranged by College
Trinity	8:00-22:00	8:00-22:00	8:00-22:00	8:00-22:00	None	Arranged by College
Victoria	8:30-23:00	8:30-23:00	closed	closed	None	Arranged by College

* Research includes graduates, faculty, staff. ** May be unavailable due to UTCS courses. □ key access available.
† Building open Mon.-Thurs. 7:00 - 22:00, Fri. 7:00 - 17:00. Building closed Sat. & Sun.

Advising Hours

CAO	Monday through Friday, 10:00 - 18:00
Scar	Monday through Friday, 09:00 - 17:00
Erin	Mon. 09:00-17:00, Tues.-Thurs. 09:00-20:00, Fri. 09:00-17:00

Services Available

Sites	PACX	Network Terminal Server	CMS Terminals	Printers	DCS/Micros
CDF	Y	N	N	Y	N
EA	N	Y	Y	Y	N
Educ	Y	N	N	N	N
Erin	Y	Y	N	Y	N
Robarts	Y	N	Y	Y	Y
Scar	Y	Y	N	Y	N
Sidney	N	Y	Y	Y	Y
St.Michael's	Y	N	N	Y	Y
Trinity	N	N	N	Y	Y
Victoria	Y	N	N	Y	Y

(Y=yes, N=no)

UTCS Services

The principle mandate of UTCS is to plan, implement, and operate computer facilities and "common-carrier" networks, and to plan and support divisional, departmental or project computer facilities as requested.

UTCS Centrally Owned and Managed

Systems

IBM MVS

- TSO, WYLBUR,APL, Batch
- 4381-R03 processor, 32 megabytes of memory
- MVS operating system

IBM VM/CMS

- General Purpose Timesharing; access to NetNorth, BITNET, and EARN networks
- 4381-P02 processor, 16 megabytes of memory
- CP operating system, VM/SP Release 3
  CMS timesharing system, VM/SP Release 3
  RSCS spooling system, Release 3

GP UNIX

- General Purpose Timesharing using UNIX
- VAX-11/750, 5 megabytes of memory
- typesetting hardware (CAT/8)
- offers USENET "news" and electronic mail to most uucp sites

Services

Communications & Technical Support
Primary Phones: 978-3787, 978-4967

- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- Field Service Group installs and maintains communications and computer systems, particularly IBM PCs, on a contract basis or on a cost-per-call basis.
- provides consulting on computer systems technology and installs computer systems
- provides access between the IBM systems and machines using UNIX, VMS and other operating systems. Ethernet and Pronet technologies are used over various transmission media including optical fibre. More basic communications techniques are also used for moderate speed links.
- provides access to NetNorth (BITNET), the North American Universities Network; and USENET, the UNIX networking fraternity
- will provide a communications solution to department needs on a contractual basis.

User Interface Group
Primary Phone: 978-HELP

- provides advising, consulting and documentation on:
  - command languages including CMS, TS0, WYLBUR, JCL and UNIX
  - high level languages including FORTRAN, APL and PL/I
  - packages and libraries including SAS, SPSS-X, BMDP, IMSL and NAg
  - editors and formatters including XEDIT, TSO, WYLBUR, ed, SCRIBE, nroff/troff
- installs and maintains application packages
- provides courses on the more popular services
- provides general micro support
  - selection consulting for hardware and software
  - Micro Lab for evaluation of hardware and software
  - advice on University discounts
  - media conversion and data transfer
  - operates UTCS Microcomputer Bulletin Board System

Facilities Managed by UTCS

Administrative Computing

- administrative IMS/VS, DB/DC, DB2, Batch and TS0
- 4381-R03 processor, 32 megabytes of memory
- MVS operating system

UNIX SAS (Statistical Analysis Services)

- UNIX Statistical Analysis Service (Dept. of Statistics only)
- PDP-11/70, 4 megabytes of memory
- UNIX Seventh Edition

Computer Disciplines Facility/VAX

VAX-11/780, 4 megabytes of memory
VAX-11/750, 4 megabytes of memory
VAX-11/750, 3 megabytes of memory

- Computer Science interactive access
- UNIX (Berkeley UNIX 4.2BSD)

Computer Disciplines Facility/PC

- 97 TI Professional Computers connected in a Local Area Network
- introductory Computer Science instruction
- MS-DOS with Turing environment

Scarborough College Systems

VAX-11/750, 5 megabytes of memory
VAX-11/750, 5 megabytes of memory
- instructional access using UNIX (Berkeley UNIX 4.2BSD)

Erindale College Systems

VAX -11/780, 4 megabytes of memory
- instructional access using VMS
- research access

VAX-11/750, 5 megabytes of memory
- instructional access using UNIX (Berkeley UNIX 4.2BSD)

Private Funding - Alumni Affairs

VAX-11/750, 6 megabytes of memory
- database services to the owner departments using VMS

EPAS Facility

- 4361-5 processor, 12 megabytes of memory
- general VM/CMS services to the owner departments

UTCS COMPUTERNEWS Subscription Request Form

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